



ISSN: 0976-3031

Available Online at <http://www.recentscientific.com>

CODEN: IJRSFP (USA)

International Journal of Recent Scientific Research
Vol. 10, Issue, 07(F), pp. 33728-33730, July, 2019

**International Journal of
Recent Scientific
Research**

DOI: 10.24327/IJRSR

Research Article

ASCORBATE EFFECT ON CYPERMETHRIN INDUCED ALTERATIONS IN THE PROTEIN LEVELS OF THE FRESHWATER FISH, *PUNTIUS SOPHORE*

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DOI: <http://dx.doi.org/10.24327/ijrsr.2019.1007.3735>

ARTICLE INFO

Article History:

Received 12th April, 2019

Received in revised form 23rd May, 2019

Accepted 7th June, 2019

Published online 28th July, 2019

ABSTRACT

Fresh water Fishes, *Puntius sophore* were exposed to chronic dose of cypermethrin with and without ascorbic acid. Total count of Protein content was recorded. Remarkable decreases in Protein content were observed in cypermethrin exposed fishes. Fishes were exposed to cypermethrin with Ascorbic acid showed less present variation in the Protein content. Pre- exposed fishes to pesticides showed fast recovery with ascorbic acid as compared to cure naturally. The role of ascorbic acid on exposure to cypermethrin of an experimental fish, *Puntius sophore* is discussed in the paper.

Key Words:

Cypermethrin, Ascorbic acid, Protein,
Puntius sophore.

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INTRODUCTION

The widespread use of pesticides has not only brought adverse influence on agro-ecosystems but also caused alteration in the physiological processes of non-target organisms including fish. The toxicant induces its effect at cellular, physiological, pathological and biochemical levels. Most of the pesticides interfere with the enzymatic action and produce many physiological and biochemical changes in the bodies of the organisms.

The accumulated pesticide interacts with biomolecules and alters the physiology of organisms. The toxic compounds exert stress to organism and organism responds to it by developing necessary potential to counteract that stress. The chemical changes occurring in the body of organism give first indication of stress (Mayes, 1977). A number of changes in biochemical parameters of aquatic organisms due to pesticide toxicity have been noted by several investigators (Shivaprasad Rao *et. al.*, 1981; Mule and Lomte, 1992, Muley *et.al.*, 1996). The indiscriminate use of synthetic pyrethroids; organophosphates organ chlorines, carbamates cause serious pollution problem in aquatic environment. Higher concentrations of toxicants in aquatic environment cause adverse effect on aquatic organisms at cellular or molecular level and ultimately lead to alterations in the biochemical composition. The pollutant affects the activity of biologically active molecules such as amino acids,

co-enzyme and other proteins containing sulphur and phosphorus, and affect physiological processes in tissues (Ghosh and Chatterjee, 1985) Biochemical changes induced by pesticide are disturbed metabolism, inhibition of important enzymes, retardation of growth and reduction of fecundity and longevity of organisms Reports are available regarding the toxic effects of pesticides on protein content of some aquatic animals (Mule and Lomte, 1993; Kaur and Dhawan 1996; Borah and Yadav, 1995). The effect of pesticides are known to induce biochemical changes in the fishes before the drastic cellular dysfunction (Manohar and Subbiah, 1982 and Das and Mukherjee, 2000).

Protein is an important organic constituent, which play important role in metabolism of organisms and metabolic activities. It is an integral part of cell membrane.

Ascorbic acid is a powerful antioxidant which plays an important role in intracellular oxidation-reduction system and in binding of free radicals produced endogenously (Laurence *et.al.*, 1997). Ascorbic acid reduced the clastogenic effects generated by certain chemical agents in the in vivo and vitro assays. (Amare *et.al.*, 1996, Khan *et.al.*, 1996). Ascorbic acid plays an important role in the distribution and excretion of trace mineral and toxicant Lewin (1974); Hughes(1974) Reported that ascorbic acid is a diffusible biological reducing agent When present in appropriate concentrations. Ascorbic acid acts

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as an essential factor for normal growth in rainbow trout *salmo gairdneri* reported by (Halver *et. al.*, 1969, Tucker and Halver 1986). Chinoy and Seethalakshmi (1977) showed impact of ascorbic acid on steroidogenesis in gastropod. Considering above cited references the effect of pesticides can be detoxified by the ascorbic acid. The present investigation reports the effect of ascorbic acid on cypermethrin induced changes in protein levels of selected tissue of an experimental fresh water fish, *puntius sophore*.

MATERIALS AND METHODS

Healthy, active and medium sized fresh water fishes, *puntius sophore* were collected from Shivan river near Nandurbar. Physicochemical parameters of water used for experimentation were studied by the methods given in APHA and AWWA (1985) The acclimatized, same sized, active healthy fishes were divided into three groups A, B and C. The group A fishes were maintained as control, group B fishes were exposed to chronic dose (LC_{50/10} dose of cypermethrin (0.5910 ppm) for 30days, while group C fishes were exposed to chronic concentration of pesticide with 50 mg/l of ascorbic acid up to 30 days. After 30 days fishes form B group were divided in to two subgroups D and E , the fishes from group D were allowed to self-cure naturally in the normal water , while fishes form E group were expose to 50 mg/l of ascorbic acid Protein content were estimated from A,B and C group fishes after 15th and 30th days of exposure and from D and E groups after 35th and 40th days of recovery, by Lowry's method Lowry's *et.al.*, (1951) using Bovine serum albumin as standard.

RESULT AND DISCUSSION

Biochemical changes in the organs of liver of freshwater fish *Puntius sophore* exposed to chronic concentration of cypermethrin with and without ascorbic acid in

Table No 1 Physico - chemical parameters of water used for experimentation

Sr. No.	Parameter	Value
1	Temperature	25.2 ± 3.2 °C
2	pH	7.60 ± 0.4
3	Conductivity	140 ± 15.7 µ mho /cm
4	Dissolved O ₂	6.3 ± 1.1 ml /l
5	Free CO ₂	3.34 ± 1.3 ml /l
6	Total Alkalinity	585.6 ± 32.8 mg /l
7	Total Hardness	204 ± 12.0 mg /l
8	Chloride	107.92 ± 16.34 mg /l
9	Calcium	30.46 ± 3.06 mg /l
10	Magnesium	31.67 ± 2.9 mg /l

Table 1 Protein contents in the liver of *Puntius sophore* after chronic exposure to Cypermethrin without and with ascorbic acid and during recovery. (Values represent percentage in dry weight)

Group	Treatment	15 days	30 days	35 days	40 days
A	Control	63.65 ± 0.3301	64.48 ± 0.3674	--	--
B	Cypermethrin	58.61 ± 0.2258*** (-7.8)	55.00 ± 0.1061*** (-14.71)	--	--
C	Cypermethrin + AA	60.91 ± 0.0113*** (-4.30)	57.36 ± 0.008*** (-11.04)	--	--
D	Recovery in Normal water	--	--	56.68 ± 0.3060## [+3.05]	62.36 ± 0.4520### [+15.2]
E	Recovery in AA	--	--	60.90 ± 0.0113### [+10.74]	63.33 ± 0.4708### [+16.96]

AA = Ascorbic acid (50 mg/l), ± indicates S.D. of three observations., Values in () indicates percent change over respective control., Values in [] indicates percent change over 30 days of respective B. * indicates significance with the respective control. # indicates significance with 30 days of respective B. p<0.05 = * & #, p<0.01 = ** & ##, p<0.001 = *** & ###, NS = Not significant.

Group A,B and C for 15th and 30th days and from Group D and E during recovery after 5 and 10 days were studied along with control fishes with respect to the percentage of protein in dry tissue powders and are given in the table 1 the protein contents in the liver of fish in presence of cypermethrin depleted with the increase in exposure period.

The changes in the protein contents of a tissue due to pesticide stress indicate the change in the activity of the organism. In presence of ascorbic acid (50 mg/l) the protein depletion is less as compared to those of cypermethrin intoxicated fishes. The pre-exposed to cypermethrin showed fast recovery in the protein levels in presence of ascorbic acid than those allowed to cure naturally. Proteins are the most important macromolecules in living being which play vital role in architecture and physiology of the cell and in cellular metabolism. Proteins have a major role in the interactions between intra and extra cellular media. As enzymes, Proteins participate in the intricately balanced sub cellular function. After the carbohydrate, the next alternative source of energy is protein. To meet the increased energy demand.

Decrease in protein may be due to enhance protein catabolism. Cypermethrin causes depletion of protein. The depletion in tissue protein may be due to impairment or low rate of protein synthesis under or due to utilization in the formation of mucoproteins which are released in the form of mucous. Proteins are essential organic constituents which play a vital role in the cellular metabolism. The increase or decrease in the protein contents due to pesticidal stress may be due to changes in the activity of acid phosphatases, rapid chemical binding of enzymes with pesticides, decrease in the synthesis of enzyme protein or increased metabolism due to stress condition (Swami *et. al.*1983).The decrease in average total protein content in all body tissues after acute and chronic treatment may be due to utilization of amino acids in various metabolic processes (Mule and Lomte,1993), Jha (1988) Supported the idea of consumption of amino acid for metabolic processes as energy source. According to Abel (1974) the depletion of protein may be due to alterations of membrane permeability. Another probability was that pollutant might block protein synthesis. Increased in protease activity in *Bombax mori* on pesticide treatment also supported depletion of protein content Gopala Rao *et. al.*, (2006) reported that protein serve as energy.

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How to cite this article:

Shinde B.R.2019, Ascorbate Effect on Cypermethrin Induced Alterations in the Protein Levels of the Freshwater Fish, *Puntius Sopheore*. *Int J Recent Sci Res*. 10(07), pp.33728-33730. DOI: <http://dx.doi.org/10.24327/ijrsr.2019.1007.3735>
